properly corrected; the imperfect sight or uncomfortable vision, which composed the principal symptoms for which he consults his physician, may be the early indications of a general disease, and the treatment required represent the best efforts in preventive medicine and the conservation of physical health, as well as mechanical optical assistance.

But our patients are not all educated, nor are they concerned sufficiently in their physical condition to consult an eye specialist for these eye symptoms; perhaps they purchase glasses from a jeweler, druggist, or even a department store, and later, if the use of the eyes is still accompanied with pain or discomfort, consult their family physician, and it is to the diagnostic skill and professional integrity of the general practitioner that he is sent to the oculist for proper treatment, the majority of physicians now recognizing many of the various aches and pains which are aggravated by eye strain.

The fact that glasses have been adjusted with intent to relieve some uncomfortable symptoms is not prima facia evidence that the glasses are correct, and if not prescribed by a competent physician it would be probable that they were not properly prescribed. If questioning elicited the information that because the patient could not spare the time, or some other equally good reason, a cycloplegic had not been used, it would be proper and right, in child or adult under fifty, to assume an incorrect prescription.

Time is to be taken into account, and the change of glasses, as a change of medicines, is necessary to meet changes in condition of the organs involved, even if the time elapsed since the last ones were given is short, for the laity have believed, and still think, that any glasses should last for years.

Even though the glasses be correct as to power and character, the position may be faulty, either through wear or accident, and the patient may volunteer the information "that at first the glasses were very satisfactory, but after a short time they began to trouble, and were doing no good now, perhaps they are crooked."

One more item is frequently brought to the notice of the family physician, when the glasses prescribed for constant use are not worn as directed, but rest a large part of the time in a pocket.

This constant wearing of glasses is frequently objected to by presbyopes, necessitating, as it does, a change from distant to reading glasses many times a day, but the use of the bi-focal lenses, which are now very perfectly made, will obviate objections of this nature.

Proper correcting lenses, placed in substantially made and adequately fitting frames, that are periodically readjusted, do much to retain, without increase, the primary condition of refraction for which the glasses were obtained, and prevent actual disease in imperfect or abused eyes. latter part is of as great importance as correct

There are cases that, not having at first the apparently beneficial effect of increased vision given to them, too readily learn to neglect or throw aside valuable aid, that to them does not seemingly give what is so popularly and unfortunately expected—mere betterment of sight—these are the cases in which such false judgment and bad decision could have been avoided had the patients been taught that there is a strict orthopedic value attached to every properly selected lens, both in its giving ease of function and insuring safety and comfort to an imperfect organ.

While it is unnecessary to relax the care and attention in selecting proper glasses, even to the delicate discrimination which must be necessary to determine the exact location of the axis of a cylinder to within less than 5°, or the power of a lens to an eighth of a diopter, it should not be forgotten that no mouth breather can be made well, nor can a dyspeptic be given normal digestion by the correction of an error of refraction, no matter how well and accurately the glasses be selected, and I present the necessity not of overlooking this correction, but in connection with the family physician to consider the other therapeutic indications.

The correction of errors of refraction then, consists of such measures as best establish equilibrium of the ocular organs and adapt them for the use to which they will be put, and these means consist of glasses properly prescribed, properly made and properly worn, as well as properly changed when changed conditions require a change in prescription, combined with such other therapeutic measures as are indicated, and this detail in optical work.

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## NATURE AND TREATMENT OF OBESITY, OR CORPULENCE OF THE MIDDLE-AGED.

By A. W. PERRY, M. D., San Francisco.

OBESITY is 20 per cent to 40 per cent excess of weight over the normal of 2.05 pounds per inch of height, or 300 grammes per centimeter.

Corpulence must be due either to; first, excessive muscular development; second, excessive fatty tissue; third, excessive water (serum) in the tissues; fourth, myxedema; fifth, pseudo-muscular hypertrophy.

The first cause is met with only in very laborious occupations and does not cause complaint; as soon as the hard work is stopped the excessive growth of muscular tissue undergoes fatty degeneration and is absorbed. The fourth and fifth causes are so rare that they only need

mention. The causes are then narrowed down to the second and third, or mixed types of these.

In my opinion, in middle-aged persons, the chief part of the excessive weight is due not to a deposit of fat, but to an infiltration of the tissues with water (blood serum). The exceptions are those persons with protuberant bellies and thin limbs. It is a latent dropsy in reality, needing only the sign of pitting on pressure to be apparent. This will be proven by argument, clinical and physical evidence.

To keep up animal heat and preserve the equilibrium of the tissues, a man of average weight, 143 pounds (65 kilos), must consume an amount of food which will produce 2300 kilo-calories under moderate exertion. The maintenance of the body weight and strength requires a minimum production of 2300 calories, which was found by Ranke (1) to be produced by the consumption of the following diet daily: Dry proteid matter, 100 grammes; fat 100 grammes; starch, 240 grammes.

This is much less than the figures of Veit (2) and a little more than those of Playfair (3); the latter found a seamstress living on proteid, 54 grammes; fats, 29 grammes; carbohydrates, 290 grammes, giving about 1660 calories per diem, and this must be assimilated and oxydized in the body. If this amount of food is not assimilated and oxydized the deficit is made up from the body tissues until the weight of the tissues has become reduced 40 per cent to 50 per cent, then the temperature becomes subnormal and death ensues.

The foregoing estimates of food values may be translated for practical purposes as follows:

**240 grammes carbohydrates=400 grammes bread.**
**24 grammes proteids is contained in 400 grammes bread.**
**76 grammes proteids=280 grammes roast beef.**
**65 grammes fat in any form.**

These statements are found in all the late works on physiology.

Playfair's minimum is the least ever found under exact studies and will be taken probably by any objector to Ranke's (min.) as a true lowest diet for any one of the same or greater weight under very moderate exertion. It is 25 per cent under the normal diet of Ranke. It was lived on by a London seamstress who earned 95 cents weekly. There is no better established fact in physiology than a minimum diet for maintenance of weight and strength.

These premises being admitted, it follows that a prolonged deficit of 20 to 25 per cent in diet from the above mentioned Ranke's normal diet must be followed by a loss of weight of the muscular, fatty, connective tissue and glandular tissue, each one losing in proportion to its being of vital necessity. Loss of weight in animals and persons dead of starvation: Heart, 3 per cent; brain, 3 per cent; blood, 27 per cent; liver, 54 per cent; spleen, 67 per cent; muscles, 31 per cent; fatty tissue, 97 per cent.

If the water excreting mechanism (the kidneys, capillaries of sweat glands, and lungs, and the vasomotor nerves controlling them) is in perfect working order, the whole body loses weight; if the water excreting mechanism is not in good order the weight of the tissues lost is replaced by water and the whole body loses slightly or not at all in weight.

We frequently meet patients who apply for reduction of weight, an examination of whose diet shows that it is much less than the above, and yet they preserve an excessive body weight. Under a diet of 20 or 25 per cent less than the above they are mathematically certain to lose fat, circulating albumen, and muscle and organ albumen. If they do not lose weight it is certain that the lost tissues are replaced by water. The often observed increase of weight after excessive use of liquids, and the corresponding loss of weight after limitation of fluids is explained (in order to hang on to the common theory that obesity or corpulence is always excessive fat) as follows: Water drinking increases the constructive metabolism, so that more fat is made and deposited from a given amount of food, and conversely destruction of fat occurs with a reduction of fluid taken.

It is a good rule, unless we have positive evidence to the contrary, to take the simplest explanation of any phenomenon. In this case the simplest explanation is that corpulency with excessive water drinking is due to the retention of water, and that loss of weight with decreased fluids depends on loss of water to the body. It is of extreme importance to know if the corpulence is fat or serous plethora or a true plethora with excess of quantity and richness of blood. It might be urged that an equilibrium of the tissue weight could exist on a deficient diet, from deficient oxydation, but there can be no such thing as a prolonged deficient oxydation with a normal or less than normal diet: this would cause lowering of the body temperature and death from the cooling of the body. There may be, however, deficient oxydation of the excess above a normal diet leading to many diathetic diseases.

Moleschott (4) found in the body of a healthy man of 60 kilos weight:

| | | | |
|---|---|---|---|
| Water 67.6% | Specific gravity | | 1.000 |
| Fat 2.5% | " | " | .930 |
| Albuminous substances 15.2% | " | " | 1.060 |
| Derivatives of " 4.9% | " | " | 1.058 |
| Salts and bone " 9.2% | " | " | 1.900 |

**These give an average body specific gravity during life of 1.012 to 1.040.—(Meeh.)**

Fat has a specific gravity of .930 and water or blood serum 1.029—when the fat exceeds a normal proportion it should reduce the body specific gravity towards .930, and if the serum is in excess and replacing the fat the specific gravity

of the body should be 1.030 and higher. This is just what is found in children from 7 to 13 years of age, who certainly have an excess of fat. The specific gravity was found by Meeh (5) (average of four children) 1.012. I found a fat boy of 12 years, weight 45 kilos, having a specific gravity of .980. Two very thin young men had specific gravity of 1.039 and 1.047; three plump females of 20 years had specific gravity 1.021, 1.025, 1.027. With stout middle aged persons the specific gravity is found to be high—1.030 to 1.040.

*Clinical Evidence*—Middle aged corpulent persons drink a great deal. In steam baths they often lose 900 to 1500 grammes weight. The difference between the night and morning measure of the leg is one inch or more. In young adults the difference is one-fourth inch. In middle age the average is one-half inch. This is due to a shifting of the serum in the lymph spaces. They lose weight on a restriction of liquids with a normal diet of bread, meat and fat, and increase in strength. By the proportion between the water taken (or watery liquids) as drink and the urine excretion, the urine should equal 68 to 80 per cent of drink in temperate climates and with moderate exertion; if it is much less than this water is accumulating in the tissues.

Serous plethora is caused by a want of balance between the ingestion and excretion of water and indicates a disorder (not necessarily a disease) of the water excreting apparatus. The capacity of the kidney to excrete water is ten times greater than the usual amount of 1200 to 1600 cubic centimeters of urine per diem. When large amounts, 2000 to 3000 c. of beer are drunk in 2 or 3 hours, Maxim and Rieder (7) found an immediate rise in blood pressure of 40 mm. of Hg in 40 minutes, which fell back to normal in two and a half hours, when most of it had been excreted with the urine or had passed out into the lymph spaces to be excreted more slowly. When this accumulation of liquid remains in the tissues we must assume some disorder of the water excreting mechanism. When 1200 cc. of liquid is taken as drink per diem with a Ranke's diet as above, 1777 cc. of water is to be excreted to maintain an equilibrium. This is made up as follows:

| | | |
|---|---|---|
| 180. | cc. | from oxydation of hydrogen of bread |
| 55.5 | " | " " " " " fat |
| 49. | " | " " " " " meat |
| 292. | " | " moisture in bread and in meat |
| 1200. | " | taken as drink. |
| 1777.5 | " | total water |

Of the 1777 cc. of water 60 cc. is excreted in the feces, at least 800 cc. from the lungs and skin, leaving about 917 cc. to be excreted in the urine. The minimum of 800 cc. estimated to be given off by the lungs and skin was found by Pettenkoffer (8) and Veit in their respiration chamber experiments on a person at rest. This is enormously increased by exercise. The loss of water excreted with the urine should be 52 to 68 per cent of the total water ingested as drink, formed from the food and contained in the food.

Diagnosis of corpulency due to serous infiltration as against true fatty infiltration: First, the specific gravity of the body is 1.030 to 1.040; second, the daily amount of urine is less than 60 per cent of the liquids taken as drink; third, they preserve an excessive body weight on 10 per cent less than a Ranke normal diet. The third method is the most reliable, but it involves weighing and measuring all food and drink except water and calculating, from the table given, the contents of each in carbohydrates, fat and proteids.

The treatment may be medical or dietetic, which last is the dry treatment used by Prof. M. J. Oertel for heart disease. The use of the thyroid extract has certainly often good results, but is often attended with disturbance and weakening of the heart action so that its use must be suspended. The use of saline purgation will reduce weight and at the same time reduce the richness of the blood in albumen, with increase of salts, both conditions to be avoided. Heinrich Stern (6) has pointed out that a free use of thyroid extract has produced diabetes. To reduce weight in serous plethora or in actually developed dropsies not dependent on primary parenchymatous kidney disease, we should allow only 300 or 400 cubic cc. more of water to be taken daily in drink and food than the daily amount of urine secreted. A minimum of 800 cc. of water will be lost by the lungs and skin, and so a net loss of 400 to 500 cc. or grammes of weight will result. The following taken from Oertel's *Kreislaufstorungen* gives the percentage of water in food prepared ready to be eaten:

Numbers indicate percentage of water: Soup, 91.6; boiled meat, 70; roast mutton, 74; roast beef, 59; roast veal, 78; dried meat, 40; fish white, 74; pudding, 48; mushes, 80; bread, hard, 30; bread, soft, 40; carrots, boiled, 82; spinach, 83; peas, 69.5; lettuce, 97; fresh fruit, 85; string beans, 88; celery, 84; asparagus, 94; milk, 87; cream, 65; cheese, 35; bakers' toast, 1.18; crackers, 7.50; potatoes, boiled, 70; turnips, boiled, 82.5, cabbage, 85.

To attempt to reduce the weight of a person with serous plethora by cutting down to less than Ranke's normal diet, namely: Meat, 280 grammes; fat 100, bread 400, is to make a serious mistake. Unless the above amount or a physiological equivalent is taken, the body will still consume that much to maintain animal heat, taking the deficit in food from its own tissue; the fats will disappear, then the muscular tissue, and a condition of debility ensues which will favor in-

crease of serous plethora and of body weight. To diminish the bread and meat of a person with serous plethora will make his blood poorer in albumen and in corpuscles and richer in water, and will still further increase the transudation into the lymph spaces and also his weight. The conditions for which reduction of weight is indicated are angina pectoris, any form of heart disease with decompensation, as shown by short breath, palpitation, edema of the feet, chronic bronchitis, with dyspnea and debility in plump middle aged persons without any obvious cause. Von Noorden says that reduction cures are indicated where chronic interstitial nephritis, rheumatism, gout, diabetes and tuberculosis are associated with obesity.

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## THE COMMON RAT.*

### WITH SOME SUGGESTIONS AS TO THE BEST METHODS FOR ITS DESTRUCTION.

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THE rat is classified by zoologists as follows: Class, mammalia; order, rodentia; family, Muridæ; sub-family, Murinæ, which contains over 15 genera. Of these we have to deal with only one genus, namely, *Mus*. This genus alone, however, contains over one hundred species, but fortunately only three have any interest to the medical or general public. They are in order of their importance: *Mus Decumanus, Mus Musculus and Mus Rattus.*

The *Mus Rattus*, or black rat, was originally a native of India and from there, by means of commerce, it has spread over the greater portion of the globe, destroying the original house-haunting species wherever they gained a foothold. They thus invaded the continent of Europe, England and America and were known as the "black rat," or "common rat" for nearly two centuries; when, owing to the invasion of their destroyer, the Norway rat, they have become almost extinct in the above-mentioned countries except parts of South America, where the lower type of development of the original species of rodents on the one hand, and the slower invasion of the Norway rat on the other, still enable it to exist to a certain extent. The body of the black rat seldom exceeds seven inches in length, while its tail is from eight to nine inches long. The color is usually bluish black, although an exception to this is met with in tropical countries where it assumes a reddish tint (the type known as *Mus Alexandrus*). The abdomen is somewhat lighter in color than other parts of the body. Compared with the Norway rat it is mild and tamable in disposition, and is the ancestor of our white rats.

*Mus Decumanus*—By far the most important, if not the only species we, as sanitarians have to deal with, is *Mus Decumanus,* or the Norway rat. This term is a misnomer, as not only is this species a native of Western China where it is still found in a wild state, but Norway and northern Europe generally were invaded at a later period than was southern Europe and England. Their almost world-wide invasion, when once begun, was rapid and unobstructed. They entered Europe by way of Asia Minor and the Mediterranean ports; were carried from Gibraltar to Western Island and from thence to England. At a still later date they were imported to America. Wherever they landed they accommodated themselves to the conditions met with, and with surprising rapidity destroyed not only the preceding invaders—the black rat—but all of the house-haunting species of rodentia which still remained except *Mus Musculus* (or common mouse), which was protected by the small diameter of their burrows and their cautious natures.

In reading the older authors who witnessed the invasion of the Norway rat, we are led to infer that they were at that time even more predatory and ferocious than their descendants of the present day. Thus, in sections of Western Island, where they first made their landing, they completely destroyed the frog and even depopulated shallow fish ponds. Soon after this, in hopes of destroying the natural wood rat, which was doing great damage to the cane fields of Jamaica, the inhabitants introduced the Norway rat. This experiment had the result so frequently seen when a foreign animal is introduced into a country to destroy another species—they exterminated the wood rat promptly, but became a worse pest themselves. This species is of heavier build than the preceding, from eight to nine inches long; the head is bluff and rounded; ears short and broad; tail shorter than body and head combined; color of an uniform grayish-brown above and white below; ears, feet and tail of a flesh color. The color may vary considerably from the above type, even be quite black. The female bears from 15 to 50 young per year, which in turn are able to become mothers at five or six months of age. This wonderful productiveness, combined with its habits, ferocity, strength and cunning, make it proof against extinction by any of its natural enemies; and these qualities, together with its adaptability to almost any conditions, its great powers of destruction, and the fact that it is probably the greatest factor in the spread of a disease that in one outbreak caused the death of one-third of the population of Europe, puts even man on the defensive. To counterbalance its natural safeguards, two factors

*Read before the State, County and Municipal Sanitary Conference of California, September 8, 1903.